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ABSTRACT

A study investigated the impact of "thought over time" as a variable that may influence recall of discrepant information encountered in the media. Earlier studies indicated that human subjects are capable of improving their recall of "consistent" sets of news information over time without the benefit of additional exposure to media information, a phenomenon known as "hypermnesia." Subjects, 50 junior and senior undergraduate students from a range of broadcast, newspaper, and magazine writing and reporting classes, were divided into 4 treatment groups that varied by medium (newspaper versus television) and message consistency (consistent versus discrepant). Subjects were asked to list each fact remembered from all the stories immediately after exposure and again 48 hours later. Subjects were asked to "think about all of the stories" during the 48 hour interval. Results indicated that: (1) subjects recalled more facts two days after exposure irrespective of message consistency; and (2) a significant difference in the amount of hypermnesia over time based on medium was not found, nor were there any interaction effects. Findings suggest that hypermnesia may occur in connection with the presentation of discrepant (as well as consistent) information if individuals can be persuaded to think about news items over time. (A figure illustrating the design of the study, one table of data, and 10 notes are included. Contains 53 references.) (Author/RS)

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Effects of Message Discrepancy on Recall of News Information over Time

Abstract

A fundamental information-processing principle holds that human subjects experience discomfort when confronted with information that is "discrepant" (i.e., in opposition) to their memories, attitudes and beliefs. The present study investigates the impact of "thought over time" as a variable that may influence recall of discrepant information encountered in the media. This study builds upon previous work which indicates that human subjects are capable of improving their recall of "consistent" sets of news information over time without the benefit of additional exposure to media information. This phenomenon is known as "hypermnesia." This study indicates that hypermnesia may occur in connection with the presentation of discrepant (as well as consistent) information if individuals can be persuaded to think about news items over time.

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Effects of Message Discrepancy on Recall of News Information over Time

Introduction

Recent advances in information processing theory suggest that human subjects may retain far more information in memory than was previously believed. "Time" (i.e., thinking over time) may actually lead to accelerated recall rather than memory decay if human subjects use the time to "rehearse" stored information. One way of forcing subjects to rehearse information is to test them repeatedly. With repeated tests, human subjects have significantly improved their recall scores in laboratory experiments. This phenomenon, improvement in recall with repeated testing over time, is known as "hypermnesia"(see Roediger and Challis, 1989, for a review).

Research on the hypermnesia effect can be traced to the "reminiscence" literature. Ballard (1913) demonstrated that children remember poetry better two days after exposure than immediately afterward. He defined reminiscence as "the remembering again of the forgotten without relearning" (Ballard, 1913, v). The meaning of the term reminiscence, however, began to change during the 1950s. Consequently, the term hypermnesia was coined during the 1970s to distinguish between two different strains of research (Payne, 1986). Reminiscence in contemporary psychology means the "intertest recovery, or recall of items on a second (or later) test that could not be recalled on a first. The overall improvement between tests, however, is hypermnesia" (Roediger and Challis, 1989, p. 177).

Psychologists have become intrigued with the hypermnesia effect because it suggests that memories may remain in storage undegraded for lengthy periods. In contrast to the proposition that memory decays with time, (Ebbinghaus, 1885/1964) newer models suggest that time may act as a

variable which strengthens recall. The act of rehearsing information is presumed to strengthen memories because mental pathways between the long-term and working memory are deepened, making it easier for individuals to retrieve previously stored information (Anderson, 1990; *New Memories*, 1991). Rehearsing may also lead to the linkage between related memories and ideas stored in other areas of the long-term memory, producing a more elegant knowledge structure (Roediger & Challis, 1989). Therefore, contrary to the proposition that memory must decay over time, the hypermnesia perspective posits that rehearsing (i.e., thinking about something) with some regularity can lead to accelerated recall over time.

While psychologists have been intrigued by hypermnesia for quite some time, it has only recently been investigated in connection with media news information processing. In an exploratory study, Wicks (1992a) reported human subjects improved their recall scores of media information by mentally rehearsing print and broadcast news stories over time. Human subjects were provided with two long newspaper stories which were designed to serve as foundations upon which to build new knowledge. Then, two experimental stories containing additional information "consistent" with the foundation stories were presented. The results indicated that subjects recalled more facts from the experimental stories after a 48-hour thinking period than they did immediately after exposure. Time, thought and repeated testing, it was argued, led to the overall improvement of recall in human subjects.

The present study will build upon this exploratory study by investigating the influence of "message discrepancy" on information recall over time. The distinction between "consistent" and "discrepant" information is important for mass communication scholars. Attitudes and beliefs consistent with previously held knowledge tend to be accepted more easily because they

are in consonance with stored knowledge. But mental discomfort (i.e., cognitive dissonance) may occur when new information contradicts previously held knowledge. Hence, this study will seek to advance previous research by investigating whether the hypermnesia phenomenon may be associated with "discrepant" as well as "consistent" sets of media information.

Literature Review

General Information-Processing Model

Mass communication studies over the years have demonstrated that human subjects have a good deal of trouble remembering much of the news information they encounter.[1] The sheer pace of a television newscast, combined with the cognitive effort needed to decode powerful combinations of audio and video stimuli, has often been cited as a reason which prevents individuals from retaining much of the information they encounter. Learning from television must also occur quickly because television news stories are transitory and cannot be reread. And typical news broadcasts force up to 20 news stories into barely 22 minutes of air time, and do so using far fewer words than the front page of a serious newspaper" (Robinson & Levy, 1986 p. 17). As for newspapers, relatively few stories are read in their entirety and as many as two-thirds of all stories are not read at all by the average citizen (Graber, 1988).

But Graber (1988) and others such as Neuman, Just and Crigler (1992) argue that learning from the media may not be as dismal as these numbers suggest. Human beings appear to survey the information environment seeking out "new" news. If this new information stimulates thought, then it may be filed in the "long-term memory store" for future use (Rumelhart, Lindsay & Norman, 1972). However, before this can occur, the new information

must pass through the "short-term" or "working memory" (Baddeley, 1976, 1986; Kintsch, 1972).[2] Rehearsal of information in the working memory is believed to lead to the development of stronger memories which may be easily and reliably retrieved in the future. This is because the activation of previously stored information strengthens pathways between the long- and short-term memory (Anderson, 1990).

Remembering news information, therefore, may well be a function of "thinking" about recently encountered information with regularity in the context of previously stored knowledge about the same topic. Further, new information related to previously held knowledge will activate a search of associative memory (SAM) which has the potential of unearthing memories that have been dormant for a time (Raaijmakers and Shiffrin, 1980, 1981). According to this perspective, human subjects are adept at joining bits of related information in the interest of producing a more general understanding of events or individuals presented through the news media (Wicks, 1992b).

The Search of Associative Memory Model (SAM) and Hypermnesia

SAM theory posits that whatever is stored in memory remains there undegraded for many years (Raaijmakers and Shiffrin, 1980, 1981; Shiffrin, 1991). "Incrementing" (i.e., the act of recalling an item) makes it more likely that this item will be remembered later. Forgetting occurs because the process of retrieving stored information becomes more difficult as time passes and new information is encountered. This is consistent with general information processing theory that posits that moving items between the long-term and working memory

strengthens the memory trace, thereby leading to greater access of stored information (Anderson, 1976; Anderson, 1990).

The second component of SAM relates to the issue of cuing and repeated sampling. The act of retrieving and recalling information serves to make information more likely to be accessible in the future because memories are strengthened through successive attempts to retrieve and sample previously encountered groups of words or pictures (Erdelyi & Becker, 1974; Roediger & Thorpe, 1978). Raaijmakers and Shiffrin (1980) report that words learned at the same time can be used to cue each other. With successive attempts over time, recall of items encountered concurrently tends to increase. Shiffrin offers an analogy of a house full of rooms to help explain the process of cuing and repeated sampling (*New Memories,* 1991). Similar items or items encountered at about the same point in time are likely to be stored in the same [mental] room. Concentration on a particular room will tend to retrieve the contents of that room rather than other rooms or for that matter. Related categories such as lists of fish, birds or presidents are also better at producing recall of items on the lists than are lists of unlike items.

The Hypermnesia Research Strategy and Threats to Internal Validity Due to Testing

In hypermnesia studies subjects are tested for recall of the stimulus material immediately after exposure and then retested again some time afterward without the benefit of additional exposure (Belmore, 1981; Erdelyi & Becker, 1974; Erdelyi, Buschke, & Finkelstein, 1977; Erdelyi, Finkelstein, Herrell, Miller & Thomas, 1976; Erdelyi, & Kleinbard, 1978; Erdelyi & Stein, 1981; Payne, 1986; Popkin & Small, 1979; Roediger & Challis, 1989; Roediger, Payne, Gillespie & Lean

1982; Roediger & Thorpe, 1978). The results of these studies indicate that with thought, individuals are capable of improving the amount they can remember over time.

This research strategy may appear to produce a threat to internal validity because improving one's score may be a function of "testing" rather than hypermnesia. The testing effect is normally to be avoided because it may affect internal validity of the study by cuing experimental subjects what to think about. In hypermnesia studies, however, repeated testing is a critical part of the research strategy. But as Roediger and Challis (1989) explain in their book chapter, "Hypermnesia: Improvements in Recall With Repeated Testing," repeated testing is used to force subjects to "work" at trying to remember stimuli to which they have been previously exposed.

Campbell and Stanley (1963) explain that testing is a concern, especially on achievement and intelligence tests, because "students taking the test for a second time, or taking an alternate form of the test, etc., usually do better than those taking the test for the first time" (p. 9). Instrument familiarity may also influence performance because subjects may anticipate the style and type of measurement (e.g., a Likert scale) during a second testing session (Cane & Heim, 1950). And, seeing a question or statement a second time may cue a subject to retrieve the answer from the earlier examination. But hypermnesia studies typically employ free recall examinations rather than standardized tests. Subjects are not told in advance what, if any, task they would be asked to perform at the time of the second session. And, the measurement instrument used tends to be nothing more than blank sheets of paper with an instruction to list items from the stimulus material.[3]

Several studies have, in fact, demonstrated that repeated testing using this strategy does not lead to hypermnesia. Erdelyi and Becker (1974) found no evidence of hypermnesia when a one-minute thinking interval is used between tests. In another study, subjects were given either one

long recall test or three successive tests (Roediger & Thorpe, 1978). The results suggest that "no difference existed in the number of unique items recalled between subjects given three successive tests and those given one long test of equivalent duration" (Roediger & Challis, 1989, p. 185). The researchers investigating the hypermnesia phenomenon conclude that time and thought, not testing, is critical to produce the hypermnesia. Repeated testing, therefore, is used simply to force subjects to work at rehearsing.

Message Consistency and Discrepancy in Information Processing

Social psychologists have long theorized that individuals strive for consistency between attitudes, beliefs, values and behaviors (Heider, 1946; 1958). Messages discrepant to previously held beliefs produce a "psychological tension" or discomfort which may result in internal pressure to eliminate or reduce the inconsistency and, if possible, achieve consistency (e.g., Festinger, 1957; Gaes, Melburg & Tedeschi, 1986; Zanna & Cooper, 1976; see Fazio & Cooper, 1983 for a review; Heider, 1946; Zajonc, 1960). This consistency may be achieved by seeking consistent information not already present (selective exposure), looking at consistent information once it is there (selective attention) and translating ambiguous information to be consistent (selective interpretation) (Fiske & Taylor, 1991).

Individuals should, therefore, attend to consistent messages in the interest of achieving consonance, and avoid discrepant messages, in the interest of avoiding dissonance (see Donohew & Palmgreen, 1971 for a review). Some evidence suggests that individuals not only avoid discrepant messages, but "selectively retain" messages consistent with their beliefs while "selectively forgetting" messages which contradict their knowledge on a topic. Levine and Murphy (1958), for

example, found that subjects confronted with pro- or anti-Soviet information learned it more slowly and forgot it more quickly when it conflicted with previously held beliefs.

In his study, Wicks (1992a) presented human subjects with several long "foundation" news stories in text form. As consistency theory suggests, subjects seem to have had little difficulty linking items from two sets of consistent news stories. Theories of cognitive dissonance, however, posit that human subjects will experience mental tension if they encounter discrepant sets of information leading to a number of possibilities such as selective attention, selective retention or selective interpretation (Anderson, 1990; Fiske & Taylor, 1991; Tankard & Severin, 1992). Therefore, discrepant information over time may very well influence the impact of hypermnesia as reported in the study described earlier. This issue will serve as one of the two primary foci in this study.

Differences Between Images and Words in Hypermnesia Research

Images have historically tended to be better at producing hypermnesia than corresponding words (Belmore, 1981; Erdelyi, Finkelstein, Herrell, Miller & Thomas, 1976). Erdelyi and Becker (1974) provided subjects with either word lists or a set of pictures that corresponded to the words (e.g., a picture of a bird or the word "bird" written on a card). Subjects in the word condition showed a decrease in recall over three recall trials while subjects in the picture condition demonstrated an improvement in recall over time. Popkin and Small (1979) instructed subjects to produce mental images from either high-imagery (e.g., horse, tree, football) or low-imagery (e.g., theory, sociology, atheist) word lists.[4] Recall increased over three trials for the high-imagery words but declined for the low-imagery words. Therefore, hypermnesia seems to occur when subjects are asked to visualize images that can be easily created by the subjects.

Smith and Magee (1980) argue that naming pictures requires greater cognitive processing than naming words. According to Roediger and his associates, not only imagery but whatever leads to increased recall (such as the construction of mental networks) should produce hypermnesia (Roediger, Payne, Gillespie & Lean, 1982). While the debate continues on the precise reason that pictures possess an advantage over words in hypermnesia, it seems clear that the act of either processing (e.g., interpreting a picture) or producing mental images may contribute to hypermnesia. With this principle in mind, the second focus of this study is to determine whether television possesses special advantages over newspapers in producing the hypermnesia effect.

Research Focus

Taken together then, the literature suggests that messages consistent with previously held memories will be more readily received because the new information will reinforce knowledge that is already in mental storage, which in turn may produce hypermnesia. But theories of cognitive dissonance suggest that discrepant messages may interfere with recall because the discomfort encountered may prompt subjects to avoid or even forget discrepant messages (Fiske & Taylor, 1991; Severin & Tankard, 1992). This issue raises the first research question:

> ***RQ1:*** Will human subjects recall more or fewer facts from discrepant sets of media information 48-hours after exposure?

The second research focus pertains to the issue of medium. The psychological literature on hypermnesia has often shown that images possess special advantages over text in producing accelerated recall over time. Most psychological studies, however, have used non-moving

single-frame images. By contrast, television news stories are a mix of narration and interviews composed of dozens of sequences with wide, medium and close-up shots. In addition, television news stories contain natural sound and production features such as graphics. And, news programs blend related stories together, creating a formidable encoding and processing task for the message recipients (Robinson & Levy, 1986). Television news stories, therefore, cannot be considered the equivalent of pictures used in psychological experiments.

In his study, Wicks (1992a) reported that medium alone as a variable "approached significance" although it failed to reach the .05 level. To explore the possibility that message inconsistency may interact with medium to produce hypermnesia when subjects are exposed to discrepant messages, the second research question is posed.

RQ2: Will television or newspaper stories interact with message discrepancy and time to produce hypermnesia?

Methodological Overview

An experiment was conducted at a major research university in May of 1990. Fifty junior and senior undergraduate students from a range of broadcast, newspaper and magazine writing and reporting classes received extra credit for participation in the study. Randomly assigned subjects were tested in small groups.[5] Subjects were told that a study was being conducted to determine what undergraduate students thought about several recent news stories (Campbell & Stanley, 1963).

Procedures

The procedures described below produced an experimental design in which time (time 1 - time 2) was a within-subject factor. Medium (television - newspaper) and message consistency (consistent - discrepant) were between-subject factors. The basic plan was to study two news items and measure the effect of message consistency, time and medium on recall. To achieve this without alerting the subjects as to the nature of the study or the specific stimulus materials, it seemed important to try to simulate the experience of reading a newspaper or watching a newscast in a laboratory setting. This was done by placing two "experimental" news stories each containing 45 facts, among a seven-story mix. Besides the experimental stories, this mix of stories contained two "foundation stories," each containing 140 facts and several "distractor" stories.

Message Consistency Manipulation

All subjects were given 11-minutes to read a set of four foundation stories presented in text form. These foundation stories manipulated the stimuli by presenting different information about the same topic. For example, 24 subjects read a foundation cited as a reprint from the Chicago Tribune containing a headline which read: "Yellowstone Let-It-Burn Policy Puts Heat on Officials." This story explained that officials in the National Park mismanaged the 1988 Yellowstone fires leading to one of the worst natural disasters in generations. The other 26 subjects read a different packet of stories containing one foundation story in which the headline read, "Forest Fires Changed Yellowstone, But Didn't Devastate It." This story explained that forest fires are therapeutic because they clear out old decaying trees, paving the way for growth

and revitalization. The experimental story supported the position that forest fires tend to have a medicinal effect on the environment.[6]

The second set of foundation stories dealt with the importance of using sunglasses to prevent damage to the eyes from ultraviolet rays. The stories were cited as reprints from Consumer Reports. Again, the first foundation article explained that new evidence now suggests that "blue light" (UVB) poses the most serious danger rather than ultraviolet light as previously believed. The second story argued that it is important to make certain sunglasses are treated with protective coatings to reduce the possibility of eye damage stemming from ultraviolet (UV) rays. The experimental story supported the proposition that ultraviolet rays (rather than blue light) poses the most serious danger.[7]

Medium Manipulation

Then, each of the two groups was divided in half. One-half viewed three television stories and one-half read three newspaper equivalent news stories. This second set of stories was varied only by medium, not by content. The television stories were drawn from several weeks of network television newscasts. They were then electronically edited to eliminate reporter standups and other production techniques that could confound the equality of the print-versus-television versions of the stories. All subjects in the sample reported that they had not seen any of the stories in the media. Pretests of these stimulus materials indicated that subjects believed that the stories had aired as they appeared.

Figure 1: Message Consistency/Discrepancy and Medium for the Treatment Groups

Television		Newspaper	
Consistent (N=13 subjects)	***Discrepant*** (N=12 subjects)	***Consistent*** (N=13 subjects)	***Discrepant*** (N=12 subjects)
Newspaper Stories Fires 1 (FC) distractor Sun 1 (FC)	Newspaper Stories Fires 1 (FD) distractor Sun 1 (FD)	Newspaper Stories Fires 1 (FC) distractor Sun 1 (FC)	Newspaper Stories Fires 1 (FD) distractor Sun 1 (FD)
Television Stories distractor Sun 2 (EC) Fires 2 (EC) distractor	Television Stories distractor Sun 2 (ED) Fires 2 (ED) distractor	Newspaper Stories distractor Sun 2 (EC) Fire 2 (ED) distractor	Newspaper Stories distractor Sun 2 (ED) Fires 2 (ED) distractor

Figure 1 above illustrates the design which produces four treatment groups in a two-by-two-by-two design in which message consistency (consistent - discrepant) and medium (television - newspaper) were between-subject factors and time (time 1 - time 2) was a within-subject factor. These treatment groups were created to assess whether any difference in recall was related to time, message discrepancy and medium. The "FC" in brackets indicates a consistent foundation story. The "FD" in brackets indicates a discrepant foundation story. The "EC" in brackets indicates a consistent experimental story and the "ED" in brackets represents a discrepant experimental story.

The print treatment was produced by transcribing the edited television stories. Modifications were made to conform to conventional print newspaper style. These adjustments were purely stylistic and did not alter the number nor ordering of facts contained in the stories. The print versions were professionally typeset to create the impression that they had appeared in newspapers or magazines. Pretests of the stimulus materials suggested that subjects believed that these articles had appeared in newspapers and magazines.

Measurement of the Variables

The experimental stories either refuted or supported the information provided in the foundation stories (Wicks & Drew, 1991). Thus, the end result was four treatment groups

varied by medium (newspaper versus television) and message consistency (consistent versus discrepant).[8]

Immediately following exposure to the stimuli, subjects were asked to list each fact remembered from all of the stories leaving a blank line between each fact.[9] Pre-tests had suggested that most students could finish the task in 15 minutes. Then questionnaires were collected. The subjects were told to "think about all of the stories" during the ensuing 48-hour period. The thinking task was designed to encourage subjects to mentally rehearse what they had learned from the news stories. They were asked to return two days later to participate in the final phase of the project. Finally, they were told that they should not discuss the news stories nor the study with anybody during the two-day period. Upon returning two days later, the subjects were given a packet and instructed to write down all of the facts that they could recall from all of the news stories that they had read or seen two days earlier. Once again, they were given 15 minutes to perform this task. The subjects were then debriefed and dismissed.

To summarize, the procedures described above produced an experimental design in which time (time 1 - 2) was a within-subject factor. Medium through which the information was transmitted (television - print) and message consistency (consistent - inconsistent) were between-group factors. In the tradition of hypermnesia studies, free recall and retest measures were taken immediately after exposure and again later to measure the effect of hypermnesia (Roediger & Challis, 1989). A 48-hour thinking interval was used to assure sufficient thinking time between recall examinations (Ballard, 1913; Wicks, 1992a).

Analysis and Results

Coders then counted the facts recalled from each story using a master code book.[10] All of the questionnaires were coded by the principal researcher. Half were also coded by a research associate. A check of reliability between the two coders produced an intercoder reliability coefficient of .93 (Scott, 1955).

Research Question 1 was intended to determine whether human subjects recall more or fewer facts from inconsistent sets of media information 48-hours after exposure. To study this issue, the number of facts recalled at time 1 and time 2 were recorded. Table 1 illustrates the mean change and standard deviation between time 1 and time 2 for the subjects exposed to the experimental television and newspaper news stories. The amount of recall for the two experimental stories was summed for time 1 and time 2 producing an overall recall quotient.

Analysis of Variance was used to uncover differences based on time, medium and message consistency. As Table 1 illustrates, subjects recalled more facts two days after exposure to the stimuli. The main effect of "time" produced a statistically significant difference $F(1,46)=13.13$ $p<.001$ indicating that mental rehearsal of news information improves recall of news information irrespective of message consistency. That is, recall scores improved even when human subjects were confronted with the task of recalling discrepant information.

Table 1: Mean Recall Scores for Consistent and Discrepant News Stories Varied by Medium

	N	Time 1	Std. Dev.	Time 2	Std. Dev.	Change	Percent Change
Consistent							
Television	13	9.08	4.03	10.77	5.36	+1.76	16%
Newspaper	13	9.08	4.15	11.62	6.25	+2.61	22%
Total	26	18.02		22.39		+4.37	+20%
Discrepant							
Television	12	8.50	4.03	9.83	5.22	+1.33	14%
Newspaper	12	6.92	3.50	8.75	3.22	+1.83	21%
Total	24	15.42		18.58		+3.16	+18%

Research Question 2 was intended to assess whether television or newspaper stories would interact with message consistency to produce greater or lesser amounts of hypermnesia over time. A significant difference based on medium was not found nor were any interaction effects. But as Table 1 illustrates, in accordance with consistency theory, consistent messages always produced the greatest recall both immediately and again 48-hours later. This finding, while not statistically significant, warrants attention in future studies.

Discussion

This study sought to build upon hypermnesia theory in a media setting by exploring the possibility that message consistency or discrepancy may act as an intervening variable in producing accelerated recall of news information over time. As Wicks (1992a) reported, mental rehearsal of consistent media news items strengthens the mental pathways making memories more permanent, and therefore easier to retrieve. But as illustrated in this study, the same seems to hold for discrepant information. So, it seems possible that with time and encouragement, individuals may overcome the effects of "*cognitive dissonance*" stemming from message discrepancy--at least with respect to how much they recall. This is important, because it posits

that human subjects may be overcoming mental discomfort associated with conflicting information if they can be persuaded to invest the time and energy in thinking about recently encountered news information.

The findings in this study may also help illuminate theoretical underpinnings of testing in free recall examinations. Testing is most commonly associated with instrument familiarity or efforts to place oneself in a more favorable light. Due to the nature of the hypermnesia research strategy, these issues are not germane. However, improvement over time in free recall examinations may represent how testing may prompt individuals to rehearse, leading to accelerated recall over time. Consistent with SAM, "related facts" and "facts learned at about the same time" appear to have produced hypermnesia in this study (Raaijmakers & Shiffrin, 1980; 1981). The act of recalling an item makes it more likely to be recalled in the future because the process of moving memories between the long-term and working memory strengthens the memory trace. In addition, similar items, or items encountered at about the same time, tend to be stored in the same mental storage area. Therefore, related items can be used to cue each other leading to enhanced recall over time.

These findings suggest other interesting and important research directions. In our society, human beings are frequently confronted with discrepant media information. In times of crisis when television news departments choose to present live news coverage, inaccuracy and mistakes are especially prone to occur. But perhaps more important, news is not static. For example, Americans may have believed that Iraq was "in the right" during the conflict between that nation and Iran in the 1980s. The Iranian hostage crisis of the latter 1970s prompted many Americans to believe that nations opposing the Iranian leader Ayatollah Khomeini were acting

appropriately. The invasion of Kuwait, however, with the implicit threat of Iraqi expansion throughout the region, prompted many Americans to "rethink" their attitudes and beliefs toward Iraq and Saddam Hussein. While this readjustment of beliefs may have been uncomfortable, it was essential to remain an informed spectator of global events.

Indeed, the concept of the marketplace of ideas embraces the notion that individuals in society should be exposed to divergent points of view. And, given time and proper motivation, it appears that human subjects are capable of rising to the occasion of constructing strong memories, even when they are confronted with discrepant information. Media managers may wish to assist their audiences in this enterprise by providing some warning that new information may be discrepant to news information presented in the past. In this respect, the media have an opportunity to contribute to the process of learning from the news.

Endnotes

1. See Chapters 4 and 5 of Robinson & Levy (1986).

2. More recently, several theorists have proposed that the working memory is the portion of the long-term store that is currently being used (Anderson, 1983; Shiffrin & Schneider, 1977). In either case, the working memory is believed to be the active part of the brain where "thinking" occurs.

3. Testing may also be associated with efforts by subjects to cast themselves in a more socially desirable way during certain types of tests (Windle, 1954). For example, subjects may develop an inventory of socially desirable responses which they anticipate using during a second examination. The issue of answering in a socially desirable way is not germane to this study, however, because the test was designed to measure recall--not attitudes or personality. For these reasons, it seems unlikely that the observed effect was not testing in the classic sense.

4. The authors used words from imagery word lists produced by Paivio, Yuille and Madigan (1968).

5. The sample size was selected in accordance with standard experimental procedures. Fifteen subjects were randomly assigned to each of the four treatment groups. As a result of experimental mortality (e.g., subjects failing to return for the second part of the study) the total number of subjects to complete the study was 50. This produced four cells ranging in size from 12 to 13 members. The cell size was above the desired minimum associated with exploratory studies (Keppel, 1982).

6. As the excerpts below indicate, Consistent Foundation Story 1 is reinforced by Experimental Story 1 while Discrepant Foundation Story 1 and Experimental Story 2 are in opposition to each other. The following excerpts from the two foundation fire stories illustrate how the message discrepancy manipulation was achieved:
Consistent Foundation Story 1: Nature replenishes itself in strange ways, and what was destroyed has already begun the regeneration process, creating a new cycle of growth that will go on for hundreds of years. Biologists estimate that in the last 10,000 years this land has had more than 300 fires as destructive as those of 1988, so what was lost will come back.
Discrepant Foundation Story 1: Due to the searing drought, that small fire soon swelled into a roaring conflagration that destroyed nearly 30,000 acres of time in Yellowstone's northwest corner. It was one of 13 major blazes this year that swept through more than half of the park's celebrated terrain, leaving almost 400,000 acres blackened and blighted.
Experimental Story 1: Park officials are now putting out the word that forest fires offer a rare change to see how nature works. They report that Yellowstone is just as spectacular as ever. Fire has always been as much a part of the forest of the American West as sunshine and rain. Fire has beneficial effects.

7. As the excerpts below indicate, Consistent Foundation Story 2 is reinforced by Experimental Story 2 while Discrepant Foundation Story 2 and Experimental Story 2 are in opposition to each other. The following excerpts from the two foundation fire stories illustrate how the message discrepancy manipulation was achieved:
   Consistent Foundation Story 2: The chief worry about UV damage centers on the lens of the eye. Recent evidence suggests that chronic, lifetime exposure to UV contributes to some types of cataracts--opaque regions in the lens that interfere with vision.
   Discrepant Foundation Story 2: What actually injures the retina if you state at the sun is not heat [or UV rays] but photochemical damage caused by shorter wavelengths of visible light -- the blue end of the spectrum.
   Experimental Story 2: Researchers say most of the glasses available are wrong, since most fail to block out enough of the harmful ultraviolet, or UV radiation, from the sun.

8. The televised news stories took a total of five minutes and forty-eight seconds to present. This amount of time was also allotted to the subjects in the print condition.

9. The instructions read: "Please list the facts in the order in which they occur to you about all of the newspaper articles you read (television stories you just viewed). You have 15 minutes to complete this list. Please place only one fact on each line and leave a space between each fact. We have provided six pages for your answers. Use as many pages as you need. If you need more paper, raise your hand and it will be provided to you." Pretests had shown that six pages was more than the subjects would need. The following excerpt from the text of the experimental story on Yellowstone National Park illustrates the basis for the coding.
   Headline: Yellowstone Fires Extinguished
   (1) Boise -- (2) The danger from fires (3) in Yellowstone National Park is over,
   (4) and officials plan to reopen the Grant Village Tour Center (5) next week.
   (6) Fires, however have hurt tourism at the park.
   (7) Park officials are now putting out the word (8) that forest fires offer a rare chance to see how nature works.
   (9) They report Yellowstone National Park is just as spectacular as ever.

10. Due to the nature of the task, coders were unavoidably aware of the consistency and medium conditions. This is because the subjects frequently referred to the fact in "the television story" or "the newspaper story." In addition, the content of the responses cued the coders as to whether the condition was discrepant or consistent because the facts contained therein were different. However, all questionnaires were randomly shuffled and efforts were may to ascertain high intercoder reliability. The following represents the an example of the coding method:
    Each fact from the foundation story about forest fires was designated as "one," as it was not necessary to distinguish between facts within a story. The facts from the experimental story about fires were designated as "seven." Each fact was also treated discretely. For example, a response indicating that "elks, deer and grizzly bears will return in the Spring" was treated as three facts because the individual recalled three discrete animals. A response indicating that "animals will return in the Spring" was treated as one fact because the individual failed

to differentiate between the discrete species. The master code book helped reduce the number of judgments that the coders needed to make.

References

Anderson, J.R. (1976). Language, Memory and Thought. Hillsdale, NJ: Erlbaum.

Anderson, J.R. (1983). The Architecture of Cognition. Cambridge, MA: Harvard Univ. Press.

Anderson, J.R. (1990). Cognitive Psychology and Its Implications (Third Edition). New York: W.H. Freeman and Co.

Baddeley, A. (1976). The Psychology of Memory. New York: Basic Books.

Baddeley, A. (1986). Working Memory. New York: Oxford University Press.

Ballard, P.B. (1913). *Oblivience and reminiscence*, British Journal of Psychology Monograph Supplements, 1, No. 2.

Belmore, S.M. (1981). *Imagery and semantic elaboration in hypermnesia for words*, Journal of Experimental Psychology: Human Learning and Memory, 7: 191-203.

Campbell, D. & Stanley, J. (1963). Experimental and Quasi-experimental Design for Research. Chicago: Rand McNally.

Cane, V.R., & Heim, A.W. (1950). *The effects of repeated testing: III. Further experiments and general conclusions*, Quarterly Journal of Experimental Psychology : 182-195.

Donohew, L. & Palmgreen, P. (1971). *A reappraisal of dissonance and the selective exposure hypothesis*, Journalism Quarterly, 48 (3): 412-420, 437.

Ebbinghaus, H. (1885/1964). Memory: A Contribution to Experimental Psychology. (H.A. Ruger & C. E. Bussenius, translators.) New York: Dover. (Originally published in 1885.)

Erdelyi, M.H. & Becker, J. (1974). *Hypermnesia for pictures: Incremental memory for pictures but not for words in multiple trials*, Cognitive Psychology, 6: 159-177.

Erdelyi, M., Buschke, H. & Finkelstein, S. (1977). *Hypermnesia for Socratic stimuli: The growth of recall for an internally generated memory list abstracted from a series of riddles*, Memory and Cognition, 5: 283-286.

Erdelyi, M.H., Finkelstein, S., Herrell, N., Miller, B. & Thomas, J. (1976). *Coding modality vs. input modality in hypermnesia: Is a rose a rose a rose?*, Cognition, 4: 311-319.

Erdelyi, M.H. & Kleinbard, J. (1978). *Has Ebbinghaus decayed with time?: The growth of recall (hypermnesia) over days*, Journal of Experimental Psychology: Human Learning and Memory, 4: 275-289.

Erdelyi, M.H. and Stein, J.B. (1981). *Recognition hypermnesia: The growth of recognition memory (d') over time with repeated testing*, Cognition, 9: 23-33.

Fazio, R.H. & Cooper, J. (1983). *Arousal in the dissonance process.* In J.T. Caccioppo & R.E. Petty (Eds.), Social Psychophysiology (pp. 122-152). New York: Guilford Press.

Festinger, L.A. (1957). A Theory of Cognitive Dissonance. Stanford, CA: Stanford University Press.

Fiske, S.T. & Taylor, S.E. (1991). Social Cognition. New York: McGraw-Hill.

Gaes, G.C., Melburg, V., & Tedeschi, J.T. (1986). *A study examining the arousal properties of forced compliance situation.* Journal of Experimental Social Psychology, 57, 239-249.

Graber, D.A. (1988). Processing the News (Second Edition). New York: Longman.

Gunter, B. (1987). Poor Reception: Misunderstanding and Forgetting Broadcast News. Hillsdale, NJ: Erlbaum.

Heider, F. (1946). *Attitudes and cognitive organization*, Journal of Psychology, 21: 107-112.

Heider F. (1958). The Psychology of Interpersonal Relations. New York: John Wiley.

Keppel, G. Design and Analysis: A Researchers Handbook (Second Edition). Englewood Cliffs, NJ: Prentice Hall.

Kintsch, W. (1972). *Notes on the Structure of Semantic Memory.* In Tulving, E. and Donaldson, W. (Eds.), Organization of Memory. New York: Academic Press.

Levine, J.M. & Murphy, G. (1958). *The learning and forgetting of controversial material.* In E. E. Maccoby, T. M. Newcomb & E.L. Hartley (eds.), Readings in Social Psychology, 3rd ed. (pp. 94-101). New York: Holt, Rinehart & Winston.

New memories may not destroy old ones after all, psychologist says. (1991, April 2). News release from Indiana University, Bloomington.

Neumann, R, Just, M. & Crigler, A. (1992). Common Knowledge: News and the Construction of Political Meaning. University of Chicago Press.

Paivio, A., Yuille, J.C. and Madigan, S. (1968). *Concreteness, imagery and meaningfulness values for 925 nouns*, Journal of Experimental Psychology Monograph Supplement, 76 (1, Part 2.).

Payne, D.G. (1986). *Hypermnesia for pictures and words: Testing the recall level hypothesis*, Journal of Experimental Psychology: Learning, Memory and Cognition, 12: 16-29.

Popkin, S.J. & Small, M.Y. (1979). *Hypermnesia and the role of imagery*, Bulletin of the Psychonomic Society, 13: 378-380.

Raaijmakers, J. G. W., & Shiffrin, R. M (1980). *SAM: A theory of probabilistic search of associative memory*. In Bower, G.H. (ed.), The Psychology of Learning and Motivation, 14: 207-262. New York: Academic Press.

Raaijmakers, J. G. W., & Shiffrin, R. M. (1981). *Search of associative memory*, Psychological Review, 88: 93-134.

Robinson, J. and Levy, M. (1986). The Main Source: Learning from Television News. Beverly Hills, CA: Sage.

Roediger, H.L. & Challis, B.H. (1989). *Hypermnesia: Improvements in recall with repeated testing*. In E. Izawa (ed.), Current Issues in Cognitive Processes: The Tulane Flowerree Symposium on Cognition (pp. 175-200). Hillsdale, NJ: Erlbaum.

Roediger, H.L., Payne, D.G., Gillespie, G.L. & Lean, D.S. (1982). *Hypermnesia as determined by level of recall*, Journal of Verbal Learning and Verbal Behavior, 21: 635-655.

Roediger, H.L. & Thorpe, L.A. (1978). *The role of recall time in producing hypermnesia*, Memory and Cognition, 6: 296-305.

Rumelhart, D.E., Lindsay, P.H. & Norman, D.A. (1972). *A process for long-term memory*. In Tulving, E. and Donaldson, W. (Eds.), Organization of Memory. New York: Academic Press.

Severin, W.J. & Tankard, J.W. (1992). Communication Theories: Origins, Methods and Uses in the Mass Media. New York: Longman.

Scott, W. (1955). Reliability of content analysis: *The case of nominal scale coding*. Public Opinion Quarterly, 17, 321-325.

Shiffrin, R.S. (1991). Personal Communication. 3 June 1991.

Shiffrin, R.S. & Schneider, W. (1977). *Controlled and automatic human information processing: II. perceptual learning, automatic attending and a general theory*, Psychological Review, 84: 127-190.

Smith, M.C. & Magee, L.E. (1980). *Tracing the time-course of picture-word processing*, Journal of Experimental Psychology: General 109: 373-392.

Tulving, E. & Donaldson, W. (1972). Organization of Memory. New York: Academic Press.

Wicks , R. H. (1992a). *Improvement over time in recall of media Information: An exploratory study*, Journal of Broadcasting and Electronic Media, 36 (3): 287-302.

Wicks, R.H. (1992b). *"Schema Theory and Measurement in Mass Communication Research: Theoretical and Methodological Issues in News Information Processing."* In S. Deetz (Ed.), Communication Yearbook 15 (pp. 115-145). Beverly Hills, CA: Sage.

Wicks, R. H. & Drew, D.G. (1991). *Learning from the news: Effects of message consistency and medium on recall and inference making*, Journalism Quarterly, 68 (1 & 2):155-164.

Windle, C. (1954). *Test-retest effect on personality questionnaires*, Educational Psychology Measurement, 14, 617-633.

Zajonc, R.B. (1960). *The concepts of balance, congruity and dissonance*, Public Opinion Quarterly, 24: 281-296.

Zanna, M.P. & Cooper, J. (1976). *Dissonance and the attribution process.* In J. H. Harvey, W.I. Ickes, & R.F. Kidd (Eds.), New Directions in Attribution Research (Vol. 1, pp. 199-217). Hillsdale, NJ: Erlbaum.